CLAIMS:

1. A method for encoding of digital watermark information in a signal, comprising steps of:

establishing a minimum and a maximum signal value;

determining a quantization interval for a range between the minimum and maximum signal values; receiving samples to be quantized into one of plural quantization levels corresponding to the quantization interval;

comparing samples to the minimum and maximum signal values;

when a potential rail error occurs, adjusting the samples to correspond to a value between the minimum and maximum signal values; and

storing the adjusted samples.

2. The method according to claim 1, wherein signal characteristics can be compressed.

3. A method for decoding of digital watermark information in an encoded signal comprising steps of:

determining a quantization interval of the encoded signal;

determining minimum and maximum values corresponding to the quantization interval for the encoded signal;

receiving the encoded signal wherein samples within the encoded signal have been adjusted to conform to a limited range of values represented by the quantization interval; and

decoding the received signal to retrieve the watermark.

4. The method according to claim 3, wherein signal characteristics can be compressed.

5. A method of encoding and decoding watermarks in a signal, comprising insertion and detection of features in said signal to carry watermark information, wherein said features are mathematical functions of the input frame and adjacent frames.

6. A method of pre-analyzing a digital signal for encoding digital watermarks using a digital filter comprising determining what changes in the digital signal will be affected by the digital filter.

7. The method according to claim 6, further comprising a step of encoding watermarks so as to ensure that the watermark will survive the changes introduced by the digital filter.

8. A method of error coding watermark message certificates using interleaved codes.

9. A method of pre-processing a watermark message certificate comprising determining an exact length of the watermark message as it will be encoded.

10. The method according to claim 9, further comprising a step of generating a watermark key which will provide at least one unique bit for each bit comprising the watermark message.

11. A method of encoding a watermark in a digital signal, comprising the steps of:

generating varying watermark key bits; and

encoding the watermark in the digital signal using the varying watermark key bits and characteristics of the digital signal.

12. A method of encoding a watermark in a digital signal, comprising the steps of:

generating varying watermark key bits; and

encoding the watermark in the digital signal using the varying watermark key bits.

13. A method of encoding a watermark in a digital signal, comprising the steps of:

mapping key and processing state information to effect an encode/decode map; and

encoding the watermark in the digital signal using the encode/decode map and characteristics of the digital signal.

14. A method of encoding a watermark in a digital signal, comprising the steps of:

mapping key and processing state information to effect an encode/decode map; and

encoding the watermark in the digital signal using the encode/decode map and characteristics of the digital signal.

15. A method of guaranteeing watermark certificate uniqueness comprising attaching a user identification dependent hash of watermark data.

16. A method of generating a noise signal to produce watermark information, wherein the noise signal is a function of at least one variable which depends on key and processing state information.

17. A method of varying a watermark to compensate for dither by changing a concentration of watermarking signal energy between higher and lower frequencies.

18. A method of encoding watermarks comprising steps of:

offsetting at least one portion of the watermark bit stream; and

encoding at least one instance of the watermark using said offset portion of the watermark bit stream.

19. A method of decoding watermarks comprising steps of:

considering an original watermark synchronization signal, an inverted watermark synchronization signal, or inverted watermarks; and

decoding based on the considering step.

20. A method of encoding watermarks in a signal using a spread spectrum technique to encode where the encoding methods is pseudo-random.

21. A method of decoding watermarks in a signal using a spread spectrum technique to decode where the decoding method is pseudo-random.

22. The method of claim 21, wherein the information is encoded and the encoding method is pseudo-random.

23. A method of analyzing composite digitized signals for watermarks comprising steps of:

obtaining a composite signal;

obtaining an unwatermarked sample signal;

time aligning the unwatermarked sample signal to the composite signal;

gain adjusting the composite sample signal to a corresponding segment of the unwatermarked signal, determined in the time aligning step;

estimating a watermarked sample signal by subtracting the unwatermarked signal from the adjusted composite signal; and

scanning the estimated watermarked sample signal for watermarks.

24. A method for varying watermark encode/decode parameters automatically during the encoding or decoding of a watermark comprising steps of:

a) assigning a list of desired parameters to a list of corresponding signal characteristics which indicate use of particular parameters;

b) during encoding/decoding, analyzing characteristics of the current sample frame in the signal stream, prior to encoding a portion of the frame;

c) looking up the corresponding parameter from the list of parameters in step (a) which matches the observed signal characteristics from step (b);

d) loading and/or preparing the desired parameter;

e) encoding the portion of the sample frame using the parameter selected in step (c).

25. The method according to claim 24, wherein signal characteristics can be compressed.

26. A method for varying watermark encode/decode algorithms automatically during the encoding or decoding of a watermark comprising steps of:

a) assigning a list of desired parameters to a list of index values;

b) during encoding/decoding, computing the index value for the current sample frame in the signal stream, prior to encoding a portion of the frame;

c) looking up the corresponding parameter from the list of parameters in step (a) which matches the index value from step (b);

d) loading and/or preparing the desired parameter;

e) encoding the portion of the sample frame using the parameter selected in step (c) in combination with an application specific scaling factor.

27. The method according to claim 26, wherein signal characteristics can be compressed.

28. The method of claim 23, further comprising the step of accessing amplitude information in the watermarked sample signal.

29. The method of claim 28, wherein the change in amplitude information represents a variation from the unwatermarked sample signal.

30. The method of claim 28, wherein the amplitude information represents a signal characteristic parameter for use in watermark decoding.

31. The method of claim 1, further comprising the step of randomly encoding watermark bits in the signal using a digital noise source.

32. The method of claim 31, the digital noise source comprises an algorithm digital noise source.

33. The method of claim 32, wherein the digital noise source is seeded with a predetermined key.

34. The method of claim 31, further comprising the step of spreading watermarking signal energy across a group of pixels to compensate for dithering.

35. The method of claim 1, further comprising the step of encoding message bits in the signal using a digital noise source.

36. The method of claim 35, the digital noise source comprises an algorithm digital noise source.

37. The method of claim 36, wherein the digital noise source is seeded with a predetermined key.

38. The method of claim 35, further comprising the step of spreading a watermark signal across a group of bits to compensate for dither.

39. The method of claim 15, further comprising the step of using additional bits to verify the user corresponding to the user identification dependent hash.

40. The method of claim 1, further comprising the step of adding one or more hash bits to a user set of bits before encoding the watermark.

41. The method of claim 1, further comprising the step of randomly varying two or more adjacent frames.

42. The method of claim 5, further comprising the step of randomly varying two or more adjacent frames.

43. The method of claim 3, further comprising the step of changing an input sample.

44. The method of claim 3, wherein a watermark occupies more time than a single frame.

45. The method of claim 44, wherein a redundant block code is used to encode watermark bits, such that n bits are encoded into a block having a length of m bits, where m is greater than n.

46. The method of claim 6, further comprising the step of encoding an audio watermark by first determining where watermark bits are inaudibly suited without introducing audible artifacts.

47. The method of claim 46, wherein the watermark bits are encoded below the predicted masking level.

48. The method of claim 46, wherein the watermark bits are encoded orthogonally.

49. The method of claim 7, further comprising the step of encoding an audio watermark by first determining where watermark bits are inaudibly suited without introducing audible artifacts.

50. The method of claim 49, wherein the watermark bits are encoded below the predicted level.

51. The method of claim 49, wherein the watermark bits are encoded orthogonally.

52. The method of claim 6, further comprising the step of encoding an image watermark by first determining where watermark bits are invisibly suited without introducing visible artifacts.

53. The method of claim 52, wherein the watermark bits are encoded below the predicted level.

54. The method of claim 52, wherein the watermark bits are encoded orthogonally.

55. The method of claim 7, further comprising the step of encoding an image watermark by first determining where watermark bits are invisibly suited without introducing visible artifacts.

56. The method of claim 55, wherein the watermark bits are encoded below the masking level.

57. The method of claim 55, wherein the watermark bits are encoded orthogonally.

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